

BASISPORIUM GALLARUM MOLL., A PARASITE OF THE TOMATO¹

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(WITH ELEVEN FIGURES)

While studying the various diseases of the tomato which are found under transit and market conditions, the writer became interested in an unusual fungus which was isolated from the California crop of November 1919. Observations have been made in the Chicago market during the past three seasons to see whether the fungus recurred on California tomatoes, or whether it could be found on those from Florida, Cuba, Mexico, and other tomato shipping districts, but this particular fungus has not been isolated again. The potential seriousness of this fungus as a wound parasite of the tomato, however, and the fact that it has not been reported as a plant pathogen, seemed to make it desirable to publish this note.

The original isolation was made from a soft, red, blister-like lesion near the blossom end of a ripe tomato. A luxuriant growth developed upon the nutrient agar plate, and a great number of spores were formed within a few days. The characteristic smooth, black, subspherical spores borne singly upon their club-shaped sporophores made it comparatively easy to place the fungus in the genus *Basisporium*.

Basisporium gallarum was established as a new genus and species in 1902 by MOLLIARD,² in order to properly locate and describe a hyphomycete which he had found upon dead larvae of *Lipara lucens* Meigen, within galls which this insect produces on *Phragmites communis* Trin. He does not mention having found this fungus before, or of later finding it upon any other host. So far as the

¹ Contribution from Research Laboratory on Market Diseases of Vegetables and Fruits; Department of Botany of University of Chicago and United States Department of Agriculture cooperating.

² MOLLIARD, M., Bull. Soc. Myc. France, p. 167. 1902.

writer has been able to ascertain, no mention has ever been made in the literature of the parasitism of *Basisporium* upon plants.¹

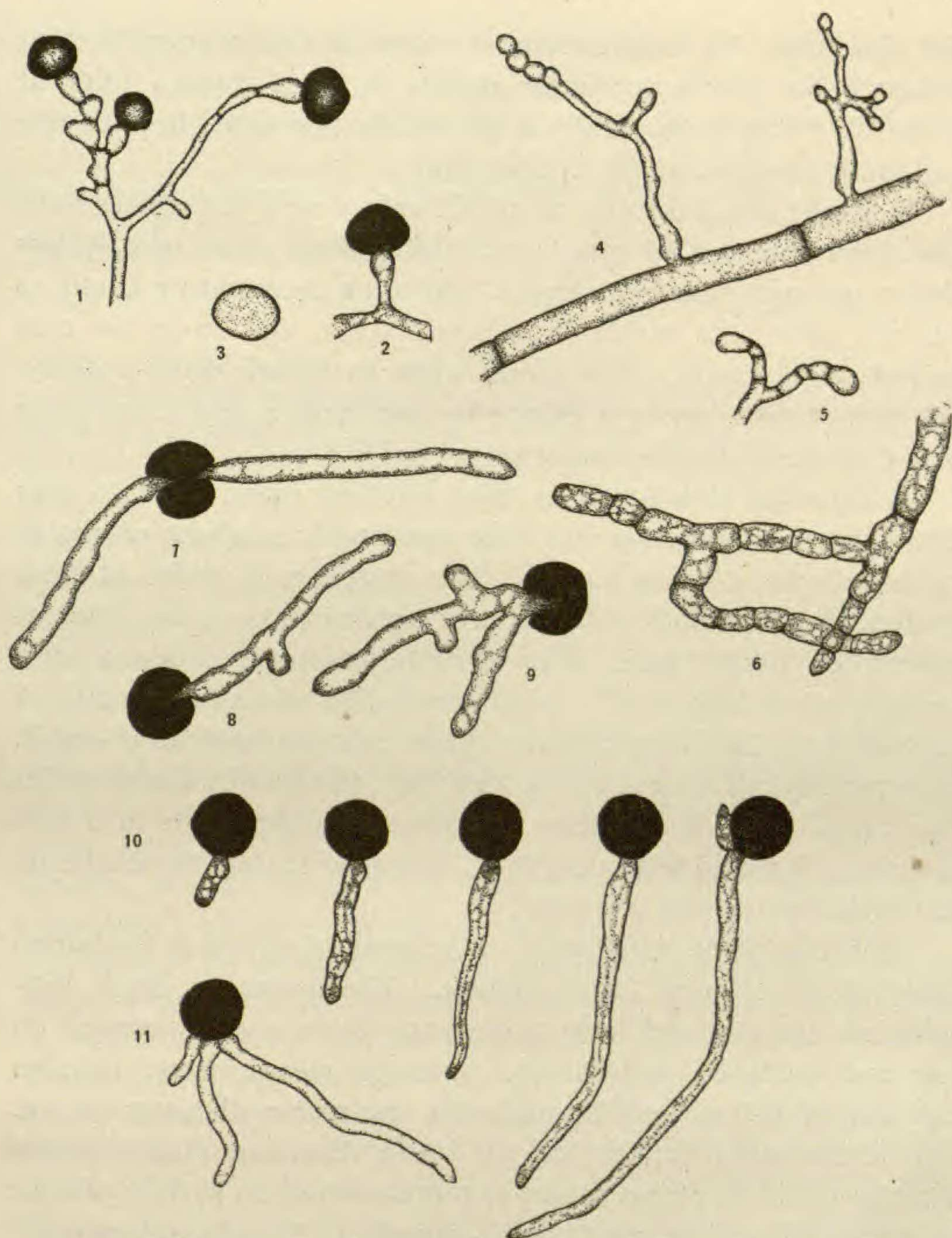
Numerous inoculation experiments have shown conclusively that the fungus is strongly pathogenic to the fruits of the tomato. Pure culture re-isolations of *Basisporium* have been obtained many times from the advancing edge of characteristic lesions produced upon fruits inoculated with a transfer from the original culture. Single spore cultures have been made and used in all experiments described, in order to avoid all possibilities of contaminating organisms.

All attempted inoculations upon unwounded surfaces of both ripe and green tomatoes have failed. Inoculations in wounded surfaces of ripe fruits have always produced the characteristic decay described. Soft, red lesions, two inches in diameter, have been produced on ripe fruits held in a moist chamber at room temperature, within four days. An abundance of pale, smoke colored mycelium is developed in a humid atmosphere. Ripe fruits inoculated in such wounds do not decay at a temperature of 9°–10° C. Specimens have been held two weeks without showing signs of decay when kept at this temperature.

Inoculation experiments with mature green tomatoes have proved positive. It is quite evident, however, that the fungus would grow much more rapidly and produce rot more quickly in ripe fruits. Green tomatoes examined after being inoculated and kept in moist chambers at room temperature for five days showed only slight surface discoloration at the wound. The locule underneath, which was turning pink, showed discoloration and decay to a depth of one-half inch.

The spores of *Basisporium* germinate readily in nutrient solutions. In freshly expressed juice of green tomatoes, as well as that of the ripe fruits, 90–100 per cent germination is obtained within twenty-four hours at 20°–21° C. At 34°–35° C. practically all spores germinate within twenty-four hours; while at 9°–10° C. only about one-half germinate in the green juice, and 80–90 per cent in

¹ In a letter, Miss A. E. JENKINS of the Office of Pathological Collections, Washington, D.C., reports *Basisporium* as having been found on cultures from corn, wheat, and dewberries.



FIGS. 1-11.—Fig. 1, sporophore bearing three slightly immature spores; fig. 2, mature spore; fig. 3, microtome section through mature spore showing thickness of opaque wall; fig. 4, large hypha on surface of agar plate bearing two young fertile hyphae; fig. 5, showing method of branching and spore formation at tips of fertile aerial hyphae; fig. 6, large sterile mycelium taken from pulp of infected tomato; figs. 7-9, spores germinated at room temperature in freshly expressed juice of ripe tomatoes; fig. 10, showing hourly growth of germinating spores in Standard Nutrient Salt Solution, at room temperature; fig. 11, spore germinated in sterile distilled water at room temperature. (All drawings made with the aid of a camera lucida.)

the ripe juice. It is interesting to note in this connection that although the spores germinate readily in fresh tomato juice at 9° – 10° C., decay is practically if not totally prevented in both ripe and green tomatoes at this temperature.

In sterile distilled water at 10° C. only a very few spores have ever been observed to germinate. After three days, usually less than 1 per cent have germinated. At room temperature about 10 per cent germinate within twenty-four hours, and 20–30 per cent in forty-eight hours. The spores seem to absorb water rapidly, and burst before having a chance to send forth a germ tube when placed in sterile distilled water at 34° – 35° C.

Basisporium grows well on most nutrient agars. Potato agar plus 2 per cent dextrose has been used with excellent results in culture studies of this fungus. The mycelium is white at first, moderately thick and cottony, later turning pale smoke color as sporulation takes place. Fine growth has been obtained at a temperature as high as 35° C., but sporulation seems to be inhibited somewhat at that temperature. Plate cultures held at 9° – 10° C. for seven days developed only a very thin, flat growth whose radius was 3 mm. Taking the other temperature experiments into consideration, it would seem that 10° C. is approximately the minimum at which *Basisporium* will grow.

Spores are borne abundantly on the terminal as well as the lateral branches of the small fertile hyphae. The spores are black, subspherical, smooth, and have a tendency to be slightly conical on top and flattened underneath. Average measurement through the axis is $11.4\ \mu$, and through the transverse diameter $15.3\ \mu$. The fertile aerial hyphae are 3.5 – $5\ \mu$ in diameter. Large sterile hyphae within decaying tissues of tomatoes and on surface of agar in plate cultures are 12 – $17\ \mu$ in diameter. These measurements show a slight variation from those given by MOLLIARD. The original drawings also show a narrower constriction of the sporophore at its junction with the spore. These differences are felt to be of minor importance, however, and, although a new host is involved, do not seem to justify the making of a new species.